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Coniferous Hosts of the Ipoidea of California.

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trees

During the past few years our knowledge of certain bark beetles has been greatly increased in the number of species known to breed in certain coniferous trees in California. Some of these species are very destructive, especially to the principal commercial species such as our sugar pine (*Pinus lambertiana*, Dougl.), our western yellow pine (*Pinus ponderosa*, Laws.) and our Jeffrey pine (*Pinus jeffreyi*, Vasey). The last is cut with our western yellow pine and the combined product is known commercially as western white pine. The most injurious Ipid beetles infesting each species are, however, often entirely different, and will be found later in this article as the first species enumerated under each host tree.

As many of these species only inhabit one species of tree or group of trees, an accurate knowledge of the hosts is most important to the forester engaged in the control of the insect depredations which become, or are liable to become epidemic. For instance, if the destructive species will only attack and become epidemic in one coniferous species, the control work is much simplified, as it need only deal with that particular coniferous species. If it attacks and breeds in several species of trees on the same area the control work is obviously much more complicated, as all species of trees infested by this beetle must be treated.

There has been considerable doubt expressed whether some species of beetles, say for instance *Dendroctonus monticolae*, Hopk., attacking the lodgepole (*Pinus contorta*, Loudon.), will, when the progeny emerges, attack another species of tree, say a sugar pine which it is also known to infest. If this doubt could be verified, epidemics in any one species could be exterminated or practically controlled without considering other species of trees infested with the same destructive beetle. It seems highly probable though that certain species of Ipids under endemic conditions will confine their attacks to one species of tree, showing a preference for specific food; but that under epidemic conditions

they will attack any of the tree species they are known to breed in.

We do know, however, that certain species breed in only one particular species of tree or one group of tree species. Certain genera of these bark borers are even confined to certain generic groups of trees.

Thus, in California the genus *Dendroctonus* (with one exception) is found wholly in the genus *Pinus*, and the *Ips* entirely in the pines. The genus *Pseudohylesinus* is found (with one exception) in the fir group of trees, and *Phloeosinus* in the cypress and redwood group. There are notable exceptions outside of California, however, where a *Phloeosinus* is found in pine, one in Canada and another in India.

For convenience therefore we may divide our California conifers into three groups. The most important species of bark beetles injurious to one group are seldom if ever, found breeding on the species of either of the other group of trees. They may be classed as follows, the groups being also botanically correct.

1. Pines.
2. Firs (including Douglas fir)
3. Cedar-like trees (*Cupressus*, *Juniperus*, *Libocedrus* and *Sequoia*)

The below insect species are placed as near as possible in the order of their economic importance, or beginning with the most destructive and terminating with the least destructive.

1. Pines.

Host - *Pinus ponderosa*, Laws.

1. *Dendroctonus brevicornis*, Lec.
2. *Ips confusus*, Lec.
3. *Ips oregoni*, Eich.
4. *Dendroctonus valens*., Lec.
5. *Ips emarginatus*, Lec.
6. *Dendroctonus monticolae*, Hopk.
7. *Dendroctonus jeffreyi*, Hopk.
8. *Conophthorus ponderosae*, Hopk.

9. *Gnathotrichus retusus*, Lec.
10. *Ips latidens*, Lec.
11. *Pityogenes fossifrons*, Lec.
12. *Pityophthorus confinus*, Lec.
13. *Ips integer*, Mann.
14. *Hylurgops subcostulatus*, Mann.
15. *Hylurgops rugipennis*, Mann.
16. *Carphoborus simplex*, Lec.
17. *Orthotomicus ornatus*, Swaine.
18. *Pityophthorus confertus*, Swaine.
19. *Pityophthorus serratus*, Swaine.
20. *Pityophthorus ponderosae*, Swaine.
21. *Xyloborus xylographus*, Say.

Host - Pinus lambertiana, Dougl.

1. *Dendroctonus monticolae*, Hopk.
2. *Ips emarginatus*, Lec.
3. *Dendroctonus valens*, Lec.
4. *Ips confusus*, Lec.
5. *Conophthorus lambertiana*, Hopk.
6. *Ips latidens*, Lec.
7. *Pityophthorus confinus*, Lec.
8. *Gnathotrichus retusus*, Lec.
9. *Hylurgops subcostulatus*, Mann.
10. *Hylurgops rugipennis*, Mann.
11. *Carphoborus simplex*, Lec.
12. *Pityophthorus tuberculatus*, Eich.
13. *Pityophthorus confertus*, Swaine.
14. *Pityophthorus ponderosae*, Swaine.

Host - Pinus jeffreyi, "Oreg. Com."

1. *Dendroctonus jeffreyi*, Hopk.
2. *Ips emarginatus*, Lec.
3. *Ips oregoni*, Eich.
4. *Ips radiatae*, Hopk.
5. *Gnathotrichus retusus*, Lec.
6. *Dendroctonus valens*, Lec.
7. *Ips latidens*, Lec.
8. *Pityogenes carinulatus*, Lec.
9. *Hylurgops subcostulatus*, Mann.
10. *Hylastes macer*, Lec.
11. *Orthotomicus ornatus*, Swaine.
12. *Pityophthorus ponderosae*, Swaine.
13. *Pityophthorus confertus*, Swaine.

Host - Pinus contorta, Loudon.

1. Dendroctonus monticolae, Hopk.
2. Ips vancouveri, Swaine.
3. Ips oregoni, Eich.
4. Ips plastographus, Lec.
5. Pityogenes carinulatus, Lec.
6. Gnathotrichus retusus, Lec.
7. Dendroctonus valens, Lec.
8. Ips radiatae, Hopk.
9. Hylurgops rugipennis, Mann.
10. Ips interpunctus, Eich.
11. Hylurgops pinifex, Fitch.
12. Orthotomicus ornatus, Swaine.
13. Ips latidens, Lec.
14. Pityophthorus murrayanae, Swaine.
15. Pityophthorus confertus, Swaine.

Host - Pinus sabineana, Dougl.

1. Ips latidens, Lec.

Host - Pinus monticola, Dougl.

1. Dendroctonus monticolae, Hopk.
2. Ips vancouveri, Swaine.
3. Dendroctonus valens, Lec.
4. Pityogenes fossifrons, Lec.
5. Ips confusus, Lec.
6. Pityophthorus confertus, Swaine.

Host - Pinus radiata, Don.

1. Ips radiatae, Hopk.
2. Dendroctonus valens, Lec.
3. Ips plastographus, Lec.
4. Hylastes nigrinus, Mann.
5. Hylurgops rugipennis, Mann.
6. Pseudo-hylesinus sericeus, Mann.
7. Carphoborus radiatae, Swaine.
8. Pityophthorus carmeli, Swaine.
9. Pityophthorus atratulus, Lec.

Host - Pinus balfouriana, Murr.

1. Dendroctonus monticolae, Hopk.
2. Ips vancouveri, Swaine.
3. Dendroctonus valens, Lec.

4. *Hylurgops rugipennis*, Mann.
5. *Hylurgops pinifex*, Fitch.

Host - *Pinus monophylla*, Torr & Fremont.

1. *Ips confusus*, Lec.

2. Firs.

Host - *Abies concolor*, Parry.

1. *Pseudo_hylesinus granulatus*, Lec.
2. *Aeectoogaster ventralis*, Lec.
3. *Aeectoogaster praeceps*, Lec.
4. *Platypus wilsoni*, Swaine.
5. *Gnathotrichus sulcatus*, Lec.

Host - *Abies magnifica*, Murr.

1. *Pseudo_hylesinus granulatus*, Lec.
2. *Leperisinus imperialis*, Eich.
3. *Eectoogaster ventralis*, Lec.
4. *Platypus wilsoni*, Swaine
5. *Gnathotrichus sulcatus*, Lec.
6. *Pityokteines elegans*, Swaine.

Host - *Pseudotsuga taxifolia*, Britt.

1. *Dendroctonus pseudotsugae*, Hopk.
2. *Pseudo_hylesinus nebulosus*, Lec.
3. *Aeectoogaster unispinosus*, Lec.
4. *Aeectoogaster ventralis*, Lec.
5. *Gnathotrichus sulcatus*, Lec.
6. *Pityophthorus confusus*, Lec.
7. *Dryocoetes pseudotsugae*, Swaine
8. *Platypus wilsoni*, Swaine.
9. *Trypodendron cavifrons*, Mannh.
10. *Pityokteines minutus*, Swaine.

3. Cypress and Redwoods.

Host - *Libocedrus decurrens*, Torr.

1. *Phloeosinus punctatus*, Lec.
2. *Phloeosinus vandykei*, Swaine
3. *Phloeosinus hoppingi*, Swaine.

Host - *Juniperus occidentalis*, Hopk.

1. *Phloeosinus juniperi*, Swaine
2. *Phloeosinus rugosus*, Swaine.

Host - Sequoia sempervirens, Endl.

1. *Phloeosinus sequoiae*, Hopk.
2. *Phloeosinus cupressi*, Hopk.

Host - Sequoia gigantea, Dec.

1. *Phloeosinus punctatus*, Lec.

Host - Cupressus macrocarpa, Hartw.

1. *Phloeosinus cupressi*, Hopk.

Host - Cupressus sargentii, Jepson.

1. *Phloeosinus cupressi*, Hopk.
2. *Phloeosinus minutus*, Swaine.

We therefore have records so far of 9 species of *Ips*; 4 *Dendroctonus*; 8 *Pityophthorus*; 2 *Pityogenes*; 3 *Hylurgops*; 1 *Gnathotrichus*; 1 *Xyloborus*, 2 *Conophthorus*; 1 *Orthotomicus*; 2 *Carphoborus*; 1 *Hylastes* and 1 *Pseudohylesinus* on Pines, or 35 known species. On firs 1 *Platypus*; 2 *Pseudohylesinus*; 1 *Heperisinus*, 3 *Aecceptogaster*; 1 *Gnathotrichus*; 1 *Trypodendron*; 2 *Pityokteines* and 1 *Pityophthorus* or 12 species.

On cedar - like trees we have only representative of the genus *Phloeosinus* - 7 species in all.

These 54 species (with the exception of a few well authenticated hosts) have been actually obtained by the author from the infested portions of the host to which they are ascribed.